

Exploring Business Model Innovation Process: Evidences from a Czech Virtual Reality Start-up

Proces innowacji modelu biznesowego: studium przypadku czeskiego startupu działającego w sektorze wirtualnej rzeczywistości

Streszczenie. Prezentowany artykuł odnosi się do procesu innowacji modelu biznesowego. W artykule zbadano, w jaki sposób startup może wprowadzić zmiany w działaniu w zakresie modelu biznesowego w obszarze wykorzystania wirtualnej rzeczywistości w edukacji służby zdrowia. Przedstawiono również nowatorskie podejście do wykorzystania wirtualnej rzeczywistości (VR) w procesie edukacyjnym. Badanie miało na celu pokazanie mechanizmów innowacji modelu biznesowego. Wykorzystuje ono metodę studium przypadku i zostało przeprowadzone na przykładzie czeskiego startupu, który prowadzi swoje działania w oparciu o technologię wirtualnej rzeczywistości i stosuje ją w takich branżach jak opieka zdrowotna, edukacja, usługi społeczne i sektor rządowy. Badanie pozwoliło na identyfikację głównych mechanizmów kształtujących elementy modelu biznesowego oraz pokazało szerokie zastosowanie technologii wirtualnej rzeczywistości. Rozwój modelu biznesowego jest wymagany na współczesnym rynku, typowym dla czwartej rewolucji przemysłowej, która prowadzi do automatyzacji i digitalizacji procesów biznesowych.

Słowa kluczowe: wirtualna rzeczywistość, model biznesowy, innowacja modelu biznesowego, startup.

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1. Introduction

The innovation process becomes a compulsory part of management policy for managers, entrepreneurs and startups operating on the demanding competitive environment.¹ The recent business literature underlined the connection between innovation process and business model. One of the approaches to understand the business model (BM) is presenting the BM concept as the architecture of value creation, delivery and capture mechanisms used by the firm. There is also the extant common understanding of BM concept as construct of commodifying a supply-side and a demand-side area of the company.² BM exists on the basis of changes in the model itself and changes in its individual components and it can be treated as a way to expand company's competitiveness.³

Innovation has always been one of the key drivers of growth and competitiveness in business. In recent years, literature and research have confirmed that business model innovation increases a company's opportunities for success much more than new products or process improvements.⁴

In the context of amplification of BM innovation process as a key driver to competitiveness in business the study is an attempt to address the following question: How innovation process and the mechanisms of innovation within business model can enhance the competitive advantage of a startup? Moreover, the paper explores how a start-up can bring change in terms of business model modification in the area of using virtual reality in healthcare education. A novel approach to using virtual reality (VR) in the educational process is also presented.

Due to the depth of the investigation required to present the main mechanisms innovating the startup's business model and showing the extension of implementing the virtual reality qualitative research was undertaken.

Specifically, the study was based on a case study methodology based on the qualitative interviews and additional sources related to the Czech virtual reality start-up.

The paper provides two main contributions. First, it is a scientific attempt to investigate the main mechanisms of business model innovation process. Second, it delivers the extend knowledge of virtual reality usage in healthcare education sector.

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- 1 A. Cavallo, A. Ghezzi, B.V.R. Guzmán, *Driving Internationalization through Business Model Innovation: Evidences from an AgTech company*, "Multinational Business Review" 2020, vol. 28, no. 2, pp. 201–220.
 - 2 L. Massa, C.L. Tucci, A. Afuah, *A Critical Assessment of Business Model Research*, "Academy of Management Annals" 2017, vol. 11, no. 1, pp. 73–104.
 - 3 D.J. Teece, G. Pisano, A. Shuen, *Dynamic Capabilities and Strategic Management*, "Strategic Management Journal" 1997, vol. 18, no. 7, pp. 509–533.
 - 4 O. Gassmann, K. Frankenberger, M. Csik, *The Business Model Navigator: 55 Models That Will Revolutionise Your Business*, FT Press, Hoboken 2014.

2. Business Model and Innovation Process

Business model research and various findings within BM development bring to the forefront the approach to defining BM in which “Business Model is the architecture of the value creation, delivery, and capture mechanisms (a firm) employs”.⁵ This definition shows the holistic approach of the construct in the identification of a firm’s key processes and searching for relations between them. This approach is going to conceptualize the value creation understood as an innovation within offering to the market, looking for the efficient methods of value delivery by relying on processes to reach customers and partners. Finally, it results in creating the monetary value for an organization, as a resultant revenue models and cost structures.^{6, 7}

Research shows the need to frame the business model in dynamic terms. This perspective reveals a company that needs to adopt or renew its business model to remain competitive.⁸

There is a considerable debate about defining the business model innovation process in a precise way. First, BM modifications of a single element are known to be considered only as a type of model improvement. Next, companies can make replacement of more elements in the model. Finally, it can be looked at as a continuous change phenomenon leading to an innovation process.⁹

It is necessary to consider the innovation process itself as a phenomenon of change, which is considered to be new to existing solutions in a company, market or industry.¹⁰

From the point of view of the business model innovation process, the changes are considered in relation to the BM elements, as well as to the architecture of the links between the elements itself. The dynamics of these changes over time should also be highlighted.¹¹

5 D.J. Teece, *Business Models, Business Strategy and Innovation*, “Long Range Planning” 2010, vol. 43, no. 2–3, pp. 172–194.

6 T. Clauss, *Measuring Business Model Innovation: Conceptualization, Scale Development, and Proof of Performance*, “R&D Management” 2017, vol. 47, no. 3, pp. 385–403.

7 M.N. Cortimiglia, A. Ghezzi, A.G. Frank, *Business Model Innovation and Strategy Making Nexus: Evidence from a Cross-industry Mixed-methods Study*, “R&D Management” 2016, vol. 46, no. 3, pp. 414–432.

8 D.J. Teece, G. Pisano, A. Shuen, *op. cit.*

9 P. Spieth, D. Schneckenberg, J.E. Ricart, *Business Model Innovation – State of art and Future Challenges for the Field*, “R&D Management” 2014, vol. 44, no. 3, pp. 237–247.

10 L. Massa, C.L. Tucci, *Business Model Innovation*, “The Oxford Handbook of Innovation Management” 2013, vol. 20, no. 18, pp. 420–441.

11 N.J. Foss, T. Saebi, *Fifteen Years of Research on Business Model Innovation: How Far Have We Come, and Where Should We Go?*, “Journal of Management” 2017, vol. 43, no. 1, pp. 200–227.

The process of BM innovation can furthermore be considered as the creation of new entities, especially during the seed period. Creation and working on the various elements of the business model is key to becoming competitive. Additionally, business model innovation is required in today's market, typical of the fourth industrial revolution, which leads to automation and digitalization of business processes. This is a digital environment typical for the development of modern startups.¹²

The scholars provides many findings on business model innovation process. However, there remains still a research gap in understanding the creation and innovation of business models for startups. Limited research exists with reference to the validation of the business model construct, existing BM change mechanisms for technology startup companies.

3. Virtual Reality Technology in Healthcare Education Sector

Virtual reality technology has been explored for more than fifteen years and applied in many sectors such as medicine, industry, education, video games, or tourism.¹³ According to Sacks¹⁴ "Virtual Reality is a technology that uses computers, software and peripheral hardware to generate a simulated environment for its user". The concept of Virtual Reality (VR) pertains to the entire simulated reality created by the computer systems by using digital formats. Researchers have indicated three key drivers linked to VR system: Immersion, Interaction and Visual Realism.¹⁵ The first driver, which is immersion, refers to the virtual technologies and devices such as virtual glasses, gloves with movement sensors or many others to enable user to interact with a virtual environment. The VR environment requires real-time

12 P.P. McDougall, B.M. Oviatt, *New Venture Internationalization, Strategic Change, and Performance: A Follow-up Study*, "Journal of Business Venturing" 1996, vol. 11, no. 1, pp. 23–40; E. Autio, S. Nambisan, L.D.W. Thomas, M. Wright, *Digital Affordances, Spatial Affordances, and the Genesis of Entrepreneurial Ecosystems*, "Strategic Entrepreneurship Journal" 2018, vol. 12, no. 1, pp. 72–95.

13 J. Martín-Gutiérrez, C.E. Mora, B. Añorbe-Díaz, A. González-Marrero, *Virtual Technologies Trends in Education*, "EURASIA Journal of Mathematics Science and Technology Education" 2017, vol. 13, no. 2, pp. 469–486.

14 R. Sacks, A. Perlman, R. Barak, *Construction Safety Training Using Immersive Virtual Reality*, "Construction Management and Economics" 2013, vol. 31, no. 9, pp. 1005–1017.

15 L.J. Rosembaum, R.A. Cross, *The Challenge of Virtual Reality*, [in:] W.R. Earnshaw, J.A. Vince, H. Jones (eds), *Visualization and Modeling*, Academic Press, San Diego 1997, pp. 325–399.

interaction. The user obtains the feedback, which permits to react and send commands to the computer by input device.¹⁶ Output devices create the conditions of visual realism and realistic illusion in a way that hardware and software should render detailed scenarios with physical models to be credible.

The arrival of VR is also observed in educational environment. It is going to facilitate and support learning styles and simulate innumerable learning scenarios. It is observed that the possibilities of the scenarios can be limited only by imagination.¹⁷

There are studies in the scientific literature linking VR and education sector as creating new way to teach and learn, improving academics performance and motivation, developing collaboratives skills and enhance psychomotor and cognitive skills.¹⁸ Moreover, the adoption of a virtual learning environment has offered a range of benefits over the traditional learning environment including flexible schedule, more individual accountability, mobility, student-centered learning, and others. Despite these benefits, the virtual spaces require smaller costs than the cost needed to build a classroom infrastructure.

According to Kirkpatrick, the effectiveness of the training was defined as four level model.¹⁹ The model clarifies four important problems linking the effectiveness of training process and usage of VR technology. Firstly, the VR training program should elicit a strong response from participants. The technology fully engages the training participants into the action and makes the real impact. In the contrary to the traditional learning environment, VR provides the real impression to exist in the realistic world. The second level refers to the learning transfer occurrence. The VR system enables the user to verify the progress and test the level of obtained knowledge and skills. The third level is linked with the measurement of the impact of the training. VR application measures with the precision whether the learning goal has been achieved. Finally, the fourth level causes the main implications for the productivity and cost reductions of the training. VR improves the learning process in the context of employees' performance.

The potential is also observed for healthcare educational sector. According to Allied Market Research, the market for virtual and augmented reality in healthcare sector is expected to reach \$2.4 billion by 2026.²⁰ Despite the relatively short

16 G. Riva, *Virtual Reality*, [in:] *Encyclopedia of Biomedical Engineering*, John Wiley&Sons, London 2006.

17 M.W. Norris, K. Spicer, T. Byrd, *Virtual Reality. The New Pathway for Effective Safety Training*, "PSJ Professional Safety" 2019, vol. 64, no. 6, pp. 36–39.

18 J. Martín-Gutiérrez, C.E. Mora, B. Añorbe-Díaz, A. González-Marrero, *op. cit.*

19 D.L. Kirkpatrick, J.D. Kirkpatrick, *Evaluating Training Programs: The Four Levels*, Berrett-Koehler Publishers Inc., San Francisco 2006.

20 Based on report *Virtual reality (VR) market – growth, trends, Covid-19 impact, and forecasts (2021–2026)*, Mordor Intelligence 2020, <https://www.mordorintelligence.com/industry-reports/virtual-reality-market> (accessed: 1.11.2021).

period of time of existing VR technology, the healthcare educational sector can already boast the success by usage VR in the process of training and educating medical personnel. VR simulated training programs have proved their efficiency in training medical students and surgeons. The technology provides a realistic environment, implicates repetitions for practice, and saves costs by reducing the number of trainers required. The number of medical institutions deploying VR in training students and professionals is constantly increasing. The evidence comes from the study conducted by Yale University School of Medicine. The study found that training surgical simulations in virtual reality (VR) would improve operating room efficiency. Objective evaluation of laparoscopic cholecystectomy showed that VR training significantly improved the results compared to the group of residents trained in traditional mode (ST). There were no significant differences in visual-spatial, perceptual, and psychomotor skills between participants randomized to the ST and VR groups when assessed prior to the training phase of the study. After the training, the dissection duration in the group trained with the VR method was 29% shorter than in the ST group, although this difference did not reach statistical significance.

The COVID-19 pandemic is recognized as a main factor to stimulate demand for VR in the healthcare industry, resulting in a various healthcare applications. COVID-19 has forced medical research labs and institutions around the world to shut their doors, halting the progress of many medical trials. The evidence comes from the case study of the collaboration of University of British Columbia and BC Women Hospital and the providers of VR technology from Accenture and Motive. io in 2020. To prevent the virus spread, the companies created the real-life reality training environment to teach and develop healthcare workers how to safely put on and take off personal protective equipment (PPE).²¹

Finally, COVID-19 can be considered as the main trigger for remote training needs for medical staff. Thanks to limiting physical interaction, virtual communication and interaction VR can be a standard for medical educational programs and training techniques. VR technology is still observed and treated as a niche industry. VR is also perceived by academics and professionals as a solution in medical education and appears to be the most prospective method to develop and use by the companies.

21 Retrieved from <https://www.accenture.com/ca-en/about/newsroom/company-news-release-accenture-motiveio-ppe-training> (accessed: 30.10.2021).

4. Case Description

Due to the nature of the problem, which is the process of business model innovation,²² the assumptions of qualitative research were adopted. The single case methodology was chosen for the reason and need to investigate the process of business model innovation in both in-depth and comprehensive manner.²³

The study presented in the paper refers to a technology startup operating on the Czech market. For reasons of confidentiality and anonymity of the company's owners, the name of the company was not provided. The choice of the technology industry, and in fact the application and usage of virtual reality, came about for several reasons. First, ICT is recognized as a sector with enormous impact. Second, virtual technology is regarded as a solution creating opportunities for innovation of business model in terms of creating the benefits (value proposition) to the market. The study focuses on a startup as the business entity that has the greatest potential to create, modify and change its business model. The entire study was based on data in multiple ways. The data obtained came from in-depth interviews with the company founders and medical personnel testing the virtual reality solution, internal company documents, website, and other secondary materials obtained from the company. Primary data source consists in four semi-structured interviews involving two owners and co-founders of the startup and two medical doctors, who tested the solution in their hospitals.

In terms of the owners, the questions and problems discussed refer to the existing policy and business model elements and mechanisms. The further step was to explore their attitudes to the innovation process of BM and showed the main possible changes in the company's strategy to capture, deliver and create value. The point of importance was to obtain the information of the potential in creating the value proposition.

In terms of the medical personnel, the main aim of the interviews was to gain their perspective of the possible usage VR for the trainings and didactic classes for medical students. It was an attempt to get both insights for the potential of using the technology as well to indicate the obstacles in implementing VR in medical educational environment.

The technological startup was founded in 2018 in the Czech Republic and operates in the industry of virtual reality. The company places its business in the trainings, systematics coaching and strategic corporate consulting. The main field

22 L. Massa, C.L. Tucci, *op. cit.*, pp. 420–441.

23 R. Dunford, I. Palmer, J. Benveniste, *Business Model Replication for Early and Rapid Internationalization: The ING Direct Experience*, "Long Range Planning" 2010, vol. 43, no. 5–6, pp. 655–674.

of its specialization is virtual reality. The company provides a wide range of virtual solutions that could be implemented for different purposes and markets.

The firm concentrated on services to the business where VR solution is used within training to enhance soft skills, facilitating feedback meetings, kick-off sessions of business projects, supporting recruitment process and conducting crucial conversations.

They had also the experience of VR usage for the development of hard skills of training participants as onboarding procedures in companies and some processes or activities to be executed by a number of employees.

General strategy of the company is building their business relying on VR as the main value proposition to support the educational system at all levels: from the primary schools up to the university level. All the management people and the team are strongly convinced of the VR value as a critical success factor in facilitating and accelerating learning. Moreover, they expand the market by reaching out to the senior segment. In this case, VR is used to activate and socialize seniors thanks to its capacity.

The company is trying to expand the market by entering the medical sector with VR. The business strategy assumes the development of virtual reality, eyewear software, enabling training for the medical industry (hospitals, universities). Due to the COVID circumstances and the preliminary research the company made, the forthcoming service is mainly tailored to support Intensive Care Units (ICU), by offering a virtual ICU simulator, enabling training for medical staff and medical students by creating the real environment of an ICU ward and restoration of the medical procedure.

The last proposed service is in the incubation stage. The owners of the company are convinced of its strategic importance and treat it as the main direction of the company's activities. Research on both the technological development of the service and its market commercialization is supported by external funding through a grant received by the company from the Ministry of Development of the Czech Republic.

The COVID pandemic has become a business impulse to capture the need for a change from the company perspective. The management is assessing the technological VR environment as the main driver to impact the current company's business model. Moreover, pandemic becomes the motivation for searching for the new market opportunities and ways of delivering the unique value.

5. Findings

The analyzed firm has admitted to developing an expansion strategy to enter foreign markets in a short period of time, and ideally with the highest demand potential for VR solutions. The management due to the pandemic see the significant growth

and growing demand for e-learning, certification and professional courses and online content. From the very words of one of the co-founder:

Our original plan is deployed the Intensive Care Unit segment by providing VR training for the personnel. We have already conducted the preliminary research in the Czech medical universities and showrooms centers. This is how we want to enter the healthcare market. Of course, we realized that our mother market is not enough and we are thinking of expansion on European Union markets.²⁴

Based on the application of CAGE analysis, management is looking to develop a business model that will work and bring business benefits in neighboring markets such as Poland and Germany. In this regard, the co-founder stated:

Our strategic direction is focused on German and Polish markets. We are looking for the business model pattern which is flexible, enables to replicate our value proposition and the strategy can consolidate the general idea of VR usage in the health sector. However, we realized that some legislation and formal factors forced us to differentiate our performance.²⁵

The company is looking forward to elaborating the pattern of business model in which implementation of the business ecosystem of partners, and incorporating them into the value creation can benefit of unique offering and delivering the value to the market.

We have identified several stakeholder groups and elements of our business ecosystem. We grouped them by role in our operations into strategic, operational and tactical partners. This market requires us to understand the operations of both hospitals and their executives, as well as the teachers or trainers themselves.²⁶

The company currently is also looking at acquiring a variety of revenue streams and investments. Funding strategy is one of the main elements of the business model shaping and innovating. The company already obtained the funding needed for product development. The management is considering to raise funding for the entering the markets. Both traditional and modern sources of funding are considered. One of the direction is crowdfunding, a type of fundraising on dedicated social networks. This method furthers comprising in return for the future share in the profits from the project after the company achieves the rate of return on capital assumed in the strategy.

The company is convinced of the strategic use of VR for medical staff education offerings in the ICU. However, it realizes that the final offering should be tailored

24 Statements from in-depth interviews with startup co-founders conducted as part of qualitative research.

25 *Ibidem.*

26 *Ibidem.*

to the needs of the users themselves, i.e. the medical staff participating in the VR-based training.

Preliminary interviews conducted with ICU physicians show both the potential for using VR and the limitations indicated by the target customer. From the very words of one of the physicians:

VR is a solution that would work well for junior doctors and medical staff. I wonder what it would look like. In the ICU, we see very large gaps in terms of the facilities themselves and the infrastructure, these are the places in the hospitals that are least capitalized. So I don't see any chance of purchasing VR technology for training purposes.²⁷

The market, represented in this study by medical personnel, dictates the importance of people's own willingness to participate in VR-based training. VR is perceived as a technology for the younger generation. Most of the personnel unfortunately have not been exposed to this technology and hence, perceive it as insufficiently attractive for training forms. At the same time the staff realizes that in the future, this technology will be used on a mass scale. Barriers to technology disappear after the first VR test. Physicians see the greatest use in recreating a virtual environment for simple, repeatable, and standardized medical procedures.

6. Conclusion

The study has got implications for both scientific purpose and practice. The development of a business model is required in the modern marketplace, typically for the fourth industrial revolution, which leads to automation and digitalization of business processes.

The findings show how new firms and startups may effectively innovate their business model. The crucial element of such a change is technology, which is likely to create the unique value. The study showed the BM as a process to create, deliver and capture the value. The main factor underlying the innovation process is technology. It allows entering new markets, increasing attractiveness of the offer and creating new services.

BM modifications also come down to finding new patterns to use. One such approach is to use the business ecosystem pattern. Instead of focusing on traditional linear – oriented organizations, firms can develop the business environment

²⁷ Statements from in-depth interviews with physicians conducted as part of qualitative research.

based on organizational form with a modular architecture consisted of different stakeholders creating the entire value proposition.

An element of BM change may also include seeking alternative sources of revenue. There are many solutions that trace their origins to peer-to-peer mechanisms and social funding. This is a characteristic of start-ups whose activities and field of operation are perceived as having increased risk.

Moreover, the study has brought the significance to the business model innovation in an international setting. The findings can be used for managerial purposes in this context to design appropriate business processes and operations.

Finally, the paper presents the better understanding of VR usage in the educational process with its particular relevance in healthcare sector. VR solutions seem to be the future technology thanks to its functionality, secure technical environment, remote conditions and future market expectations.

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